

new forms. 3. The disappearance of the nuclei is accompanied by a peculiar star-shaped formation, which Auerbach deduces from the flowing apart of the nucleus matter. Bütschli has lately published new observations on the same subject ("Siebold's und Kölliker's Zeitschrift für wissenschaftliche Zoologie," 1875), from which it must be specially pointed out that even the first nucleus of the fertilised ovum of some Nematoidea, and of the fresh-water mollusc, *Limnæus*, results from the confluence of several little bubbles. Flemming has found Auerbach's observations confirmed with the fresh-water shell, *Anodonta* ("Archiv für mikroskopische Anatomie," band x., and "Sitzungsberichte der Akademie der Wissenschaften zu Wien III. Abtheilung," 1875); he only differs so far from Auerbach in the interpretation of what he saw, that he does not deduce the "carpolytical figures" of the latter from the nucleus matter which radiates from the centre of the nucleus, but from a peculiar structure in the surrounding yolk-protoplasm, which he considers to be in connection with each division of the yolk and the new formation of the nuclei. But he does not interpret the process of this new formation. Flemming, in his second paper, describes the observations on a radiated arrangement of the yolk, which had previously been made occasionally with several other animals, without the observers being able to explain these phenomena or trying to investigate them further. We must, however, remark here that Goette, in the work we mentioned in our last report, has not only completely described the interior process of the division of the ovum of *Reptilia*, but has also attempted a uniform explanation of the same. According to his experience no nuclei at all are formed for some time in the division parts of the yolk, but only nuclei-shaped interior transformation products of the yolk, which are only apparently separated from their surroundings, but are in reality in continuous connection with them. These interior formations originate as collecting points of a radiated and universal protoplasm current in the yolk, which in turn results from the reciprocal action of the ovum and the surrounding medium. The difference in the currents is said to cause (in a manner described in detail) the division of these interior formations, and, as a consequence, the division of the surrounding yolk material. The radiated arrangement of the latter round the brighter centres is only imperfectly visible in *Batrachia*; but Goette has observed it in the ova of *Ascidia*, and interpreted it in the way just described. The definite nuclei of embryo cells, which result immediately from the division of the yolk, Goette supposes to be formed within those centres from a number of grains, which are at first greatly augmented, and then finally unite completely. But these origins of the nuclei do not disappear during the divisions of the yolk. If now we compare all the observations mentioned, we first of all find them all agreeing that the division of the yolk is no simple cell division, such as is elsewhere found in the tissues of developed organisms; for the remainder, the observations do not agree. While Goette supposes a gradual and continual progress of the formation of cells beginning from the first division, the other observers incline to the belief that at each division an interruption and a consequent re-beginning of the formation of cells takes place, as the once formed nuclei are said to disappear continually and new ones are said to form.

NOTES

THE U.S. Government have just shown in a handsome manner their appreciation of the services rendered by Dr. Henry Draper in connection with the U.S. observation of the recent Transit of Venus, by presenting him with a gold medal made at the U.S. Mint at Philadelphia. On the obverse is the motto, from Virgil, "Famam extendere factis hoc virtutis opus est," and in the

centre a figure of the heliostat which was used by Dr. Draper in training the photographers. On the reverse is the inscription, "Veneris in sole spectandæ curatores, R. P. F. S. Henrico Draper, M.D., Dec. viii. MDCCCLXXIV." The phrase around the edge of the reverse, "Decori decus addit avito," conveys a tribute of praise to the literary and scientific attainments of Dr. Draper, sen. The Transit Commission have also sent Dr. Draper a handsomely bound set of resolutions illuminated in mediæval style, with a telescope, camera, &c. We are sure all scientific men will join in congratulating Dr. Draper on his well-deserved honour, and at the same time the U.S. Government on their enlightenment in thus acknowledging the glory which the triumphs of pure science have shed upon a nation; they have set a striking example to our own and other European Governments.

THE fifth session of the French Association for the Advancement of Science, as we intimated in our last number, will be opened to-day at Nantes. The principal attraction will be the excursions; one of them will last for more than three days, a war-steamer having been placed at the service of the Association by the Minister of Marine. The excursionists will visit Vannes and its prehistorical museums, the megalithic monuments of Locmariaques, the celebrated remains at Carnac, the island of Belle-île, and Lorient. No doubt there will be a great rush for the excursion. The list of papers to be read is a very long one. In the Mathematical Section a large number of the papers are on engineering subjects, and in the Natural Science Section a large proportion are on medical subjects, besides a good many on prehistoric archæology. Among the latter class are the following:—Dr. Broca, On the anthropology of Brittany; The Dolmens of the Lozère, by Dr. Prunières; On the funeral rites of prehistoric times in Scandinavia, by M. Waldemar Schmidt. Other papers in this section are: On a new elementary theory of botany, by Dr. Ecorchard; On the meaning which it is proper to attach to the word "Mollusc" as a taxonomic term, and On the organisation of Rhizomes, by Dr. Gulland; On the Fauna of the Lake of Tiberias, by Dr. Lortet; On the pressure and rate of the blood in the arteries, by M. Marey. In the Section of Physical and Chemical Sciences we note the following:—On Microzymes in their relation to fermentation and physiology, On two new principles of wine, and On the origin of Bacteria, by Prof. Béchamp; Experiments on the rate of light between the Paris Observatory and Montlhéry, by M. A. Cornu; On the use of the spectroscope in the manufacture of Bessemer steel, by M. V. Deshayes; The meteorology and physics of the Polar Regions, by the Abbé Durand; On molecular combinations, by M. C. Friedel; On the limits of permanent snow and ice on the surface of the globe, On a magneto-dynamic galvanoscope, and On the chemical constitution of albuminoid matters, by M. P. Schützenberger; On a polymer of the oxide of ethylene, and on the dissociation of the salts of aniline, by M. A. Wurtz. There will be two public lectures—one by Prof. Bureau, of the Paris Museum, On the Natural Sciences at Nantes, and the other, On Acoustics—the *timbre* of sounds, by Dr. Gavarret.

THE above Association is not the only French institution which was created after the model of the British Association. M. de Caumont, who died four years ago, instituted another annual scientific congress, which will hold its forty-first session at Périgueux, in the department of Dordogne. Every year this association meets in a provincial town during summer, and at Paris during the recess of Easter. The members are mostly Legitimists and Roman Catholics.

THE forty-eighth meeting of the German Scientific and Medical Association will commence this year on the 17th of September at Graz (Austria). The two branches will be

presided over by Drs. Rollet and von Tebal of that University, who have issued the following programme: Sept. 17, 8 P.M.—Preliminary Meeting. Sept. 18, 10 A.M.—First General Meeting; 1 P.M.—Sectional Meetings; 8 P.M.—Reunion; Sept. 19.—Excursion to the Castle, Sectional Meetings, Evening Concert at the Theatre. Sept. 20.—Sectional Meetings and Excursions. Sept. 21.—Second General Meeting, Sectional Meetings, Festive Performance in two Theatres. Sept. 22.—Excursions. Sept. 23.—Sectional Meetings, Banquet. Sept. 24.—Third and Concluding General Meeting, Ball. The Sections will be divided as follows: (1) Mathematics and Astronomy. (2) Natural Philosophy and Meteorology. (3) Chemistry. (4) Mineralogy, Geology, and Palæontology. (5) Botany. (6) Zoology. (7) Anatomy and Physiology. (8) Medicine. (9) Surgery. (10) Ophthalmology and Otiatri. (11) Midwifery. (12) Psychiatry. (13) Public Health. (14) Military Surgery. (15) General Pathology. (16) The Teaching of Science. (17) Agriculture.

A CONGRESS has been held at Nancy on the history, archæology, and languages of the American continent. The city was illuminated, and a banquet was given by the municipality to the foreign members of the Congress. A most interesting exhibition took place, principally of American stone implements, Peruvian mummies, Columbian idols, and skulls of a number of the aborigines. The Congress discussed the questions relating to the discovery of America before Columbus, by Norwegians, Phœnicians, and Buddhists, and did not appear inclined to believe in the reality of any of the traditions. There were also discussed at some length the relations of Esquimaux tribes with those of Northern Asia, traditions as to white men, the monuments of the Mississippi Valley, and the rock inscriptions, without coming to any definite conclusions.

THE observation of meteors has been organised in France by the Association Scientifique under M. Leverrier; this organisation numbers more than 6,000 members, but has no annual meeting. About forty stations keep watch on critical nights. The results of the observations during the time of the August shower have been unusually good. At Rochefort and Rouen alone more than 160 tracks were mapped during the nights of the 9th and 10th of August, mostly connected with the Perseus radiant.

THE preparations for the Scientific and Agricultural Congress at Palermo on the 29th inst. are proceeding with unabated activity. Many *savants*, particularly from Germany, have intimated their intention to assist at the proceedings. Father Secchi will preside in the department of Astronomy.

FROM observations made upon the Manatee living in the Zoological Gardens, Regent's Park, the Society's Prosector has had the opportunity of presenting a paper to be read during the next session of the Scientific Committee of the Society, on the peculiar prehensile power of the upper lip of that animal, by which it seizes its food between the two lateral bristle-covered pads with which that organ is provided, and which it can move laterally.

THE *Journal of Anatomy and Physiology*, which till now has done much service to biologists under the able editorship of Prof. Humphry, of Cambridge, and Prof. Turner, of Edinburgh, is to be further strengthened in the Physiological Section by the extra editorial assistance of Dr. Michael Foster, of Cambridge, and Prof. Rutherford, of Edinburgh. The journal is also to appear quarterly, not half-yearly, as heretofore.

THE Transactions of the Zoological Society, vol. ix. Part iv., just issued, comprises a memoir, by Mr. Sclater, F.R.S., "On the Curassows now or lately living in the Society's Gardens." It is illustrated with thirteen coloured quarto plates from the

pencil of Mr. Smit, and forms a complete monograph of all the known species of true curassows.

M. E. MULSANT, Conservator of the Library of the City of Lyons, is on a visit to this country for the purpose of examining Messrs. Salvin and Godman's, as well as other collections of birds, in order to render more complete his "*Histoire Naturelle des Oiseaux-Mouches*," now in course of publication.

CAPT. BURTON and party have just returned from Iceland. The immediate object of the visit was to examine the extensive sulphur mines which were worked in the north-eastern part of the island about the beginning [of the present century, and for the reopening of which a company has recently been formed. The result of the visit seems in this respect to have been satisfactory. Mr. W. L. Watts met Capt. Burton's party, just after he had performed the remarkable feat of crossing the Vatna Jokul, an immense snowy table-land in the S.E. corner of the island. Mr. Watts has been the first to accomplish this feat.

IN the note concerning a shower of hay in Denbighshire in last week's NATURE, p. 298, we omitted to say that the year in which the occurrence took place was 1857.

THIS year's meeting of the British Archæological Association was opened at Evesham on Monday by the President, the Marquis of Hertford, who reviewed the several points of interest which the Association intended to visit in Warwickshire and Worcestershire.

THE most important paper in the July number of the *Bulletin* of the French Geographical Society is on the geography of the Athabasca-Mackenzie region, by the Abbé E. Petitot, who has spent twelve years as a missionary in that inhospitable portion of North America, making many journeys to all parts of the district indicated, lying between the Coppermine River and the Rocky Mountains, and the Great Slave Lake and the Arctic Ocean. The Abbé gives a brief *résumé* of discovery in this region, and a short sketch of the various journeys he himself made, to be followed by further details. An excellent map accompanies the narrative, and although the explorer's instruments were rather scanty, it is evident that he has added largely to our knowledge of the geography of the district of country referred to.

ANOTHER interesting paper in the same number is on the Lyssous of Lin-tze-Kiang, by another missionary, the Abbé Dubernard. It is notable how large a number of French explorers have been missionaries.

A RETURN has been presented to Parliament giving a statement of all the weather telegrams issued by the Meteorological Office, and also of all the storms experienced on the coasts of the British Islands during 1874, from which it appears that of the warnings issued, 78.2 per cent. were justified by subsequent gales or strong winds, and that 16.4 per cent. were not justified by the subsequent weather. This percentage of success in the warnings issued, which is slightly in excess of the last two years' of Fitzroy's management, considerably in excess of 1870 and 1871, and about equal to the results for 1872 and 1873, is perhaps as good as may reasonably be expected until the system be further extended and developed.

WE have received a circular calling attention to the success attending the working of Dr. Herman Sprengel's improvement in the manufacture of sulphuric acid. The process was patented in 1873, and consists in injecting water in the form of spray into the chambers instead of steam. To effect this a jet of steam escapes from a platinum nozzle at a pressure of about two pounds, and blows through the centre of a flowing jet of water by means of an apparatus similar in principle to Herapath's blow-pipe. These jets are let into the side of the chamber at distances of 40 feet. The advantages gained are economy of

fuel, nitric acid, and pyrites. The method has been in use at the works of the "Lawes Chemical Manure Company" at Barking, and the returns show that a saving of coal to the amount of $\frac{3}{4}$ of the quantity formerly burned has been effected—the total saving in steam, nitric acid, and labour during three months, amounting to five shillings per ton of acid of sp. gr. 1.6 made from pyrites. The patentee just points out that a saving of even one shilling per ton means in this country an annual gain of 50,000l.

THE Rev. N. M. Ferrers, of Cambridge, author of "A Treatise on Trilinear Co-ordinates," is preparing for the press a work on Spherical Harmonics. The plan adopted in this work will be first to discuss thoroughly the properties of the Zonal Harmonic, for which various expressions will be given, and general formulæ investigated, by which any rational integral function of one independent variable may be expressed in a series of Zonal Harmonics. The properties of Tesseral and Sectorial Harmonics will then be deduced from these. The expression of a discontinuous function by means of Spherical Harmonics will be discussed; and various examples will be given of the use of Spherical Harmonics in their applications to the theories of attraction, and of electricity and magnetism. The book will be published by Messrs. Macmillan and Co.

"PYTHAGOREAN Triangles" is the title of a paper which was read by W. Allen Whitworth, M.A., before the Literary and Philosophical Society of Liverpool in February of the present year. A Pythagorean triangle is a right-angled triangle having all its sides commensurable. The most familiar instance is that triangle whose sides are in the ratio of the numbers 3, 4, 5. The author shows that one of the sides must be even (a multiple of 4), one a multiple of 3, and that either a side or the hypotenuse must be divisible by 5. Making use of a discovery of Fermat's, he further shows that every prime number of the form $4N + 1$ is the hypotenuse of such a triangle. The most general results obtained are "the product of n prime hypotenuses, all different, will be itself the hypotenuse of 2^{n-1} Pythagorean triangles;" this result is modified if m only are different, to 2^{m-1} Pythagorean triangles. With the aid of these results he presents, in a tabulated form, 395 such triangles, with hypotenuses less than 2,500. We may mention that in Tebay's Mensuration a table of some 200 of these triangles is given, but with no indication as to how they are obtained. A great deal of information on the subject of these triangles is given in vol. xx. of "Mathematics from the Educational Times," at pp. 20, 54, 75, 76, 87, 97–100, to which we refer such of our readers as may be interested in the matter.

THE West Riding Consolidated Naturalists' Society have published the first number of a new monthly journal, the *Naturalist*. A journal with a similar title was published in the same district during the years 1865–6–7; we hope the present one will have a much longer life. Its principal object is to afford a means of communication among all Natural History Societies, either within or outside the county of York.

FROM the fourth Annual Report of the Chester Society of Natural Science, we are glad to see that the Society is prosperous and in good working order. The members now number 541, and during the past year several excursions have been made, several general meetings held for lectures, and the regular work of the sections carried on. Altogether this Society seems in a hopeful condition. The same Report contains a brief report of the Wrexham Society of Natural Science, which seems to some extent to be under the fostering care of its more prosperous Chester sister. It seems to be, on the whole, doing well.

MAJOR WOOD has sent us a reprint of two papers, with a map, on the Aralo-Caspian region; they originally appeared in the *Globe*, the journal of the Geographical Society of Geneva. Ramboz and Schuchardt, of Geneva, are the publishers.

THE additions to the Zoological Society's Gardens during the past week include a Red Deer (*Cervus elaphus*), European, presented by Mr. Samuel Carter; a Malabar Squirrel (*Sciurus maximus*) from S. India, presented by the Chevalier Blondin; two Purple Cow Birds (*Molothrus purpureus*) from Peru, presented by Prof. W. Nation; a Yellow-fronted Amazon (*Chrysotis ochrocephala*) from Guiana, presented by Mrs. Bolton; a Crested Peacock Pheasant (*Polyplectron chinquis*) from Malacca, purchased; three Hoffmann's Sloths (*Choloepus hoffmanni*) from Panama; three Spotted Cavies (*Calognyx paca*), a Coypu (*Myopotamus coypus*) from S. America, an Argus Pheasant (*Argus giganteus*) from Malacca, deposited.

ON THE ACTION OF URARI ON THE CENTRAL NERVOUS SYSTEM

SINCE the introduction of urari twenty years back it has become more and more employed as an anæsthetic for physiological experiments. Its effects on the peripheral portions of the nervous system have been carefully studied, and are most distinct and peculiar, so much so that they seem to have diverted attention from its action on the central organs. Its effect, briefly, when injected subcutaneously, is to produce a paralysis of the motor nerves by attacking their ultimate branches. Dr. Foster, at whose suggestion these experiments were undertaken, and to whom I am indebted for much assistance, in the "Handbook for the Physiological Laboratory" establishes the following propositions:—1. "The effect of urari is to destroy or suspend the irritability of nerves, but not of muscles." 2. "With moderate doses of urari the small branches appear to be poisoned and to have lost their irritability, while the trunks are still intact." He also points out that "in order to bring these results out well, the dose of poison must not be more than sufficient to poison the motor nerves. Subsequent or stronger action of the poison affects the central nervous system as well." Now it is perfectly clear that the poison produces no appreciable effect on the sensory nerves, and in consequence rash conclusions have been drawn that it also has no effect on the sensorium, and is, in fact, not an anæsthetic at all.

The method of investigation employed was to take two frogs, as nearly as possible alike in size and vigour, and to pass a ligature round the whole abdomen (on Bernard's plan), taking care to exclude from the ligature the sciatic plexus and to include the blood-vessels. To one of the frogs a dose of urari was then administered, and the two placed under similar conditions and watched. The ligature in the poisoned frog of course prevented the urari from gaining access to the hinder limbs, while it could act fully on the nerve centres; and the behaviour of this frog could be compared with one which had merely undergone the operation, and was clearly possessed of consciousness and volition. We will call the two frogs A and B, B being the one which has the dose of urari. Now as soon as the poison took effect, movements of respiration of course ceased, and the frog lost control over its fore-limbs. On placing them side by side in an unconstrained position, A constantly moved, executing large and small movements with precision; its actions seemed in no way different from those of an uninjured frog. During this time the frog B never moved, and although quite capable of using its hind limbs, never did so; at rare intervals (perhaps half an hour), however, a movement was executed, but of a very distinct kind, a mere kick, such as a frog gives after the removal of its brain, in virtue of pure reflex action; now the innervation of the hind limbs was quite intact; the animal, if possessed of any wish to move them, was quite able to do so, so far as its structural arrangements were concerned. Indeed, the frog bore a striking resemblance to one which had had its brain removed; it behaved in almost every respect in the same manner.

If the two frogs be now laid on their face, a most convincing experiment can now be tried. If the leg of A be forcibly extended and let go, it is drawn up; if it be extended and held for a short time, it is again drawn up. Now if the leg of B be extended and at once released, it is also drawn up; but if it be held for a second against the efforts of the animal to withdraw it, these efforts cease and the limb retains its position for an almost indefinite period. Now there can be only one explanation of the behaviour of the frog B, namely, that the urari destroys consciousness and volition at an early period; that on extending